OBJECTIVE 2.15 Identify Acceptable Vehicle Control Methods.

INTRODUCTION

A student must be able to identify acceptable vehicle control methods before they demonstrate them. This objective will identify acceptable methods for the following vehicle control considerations:

1. Acceleration and deceleration
2. Braking
3. Vehicle Positioning and Steering

CONTENT

ACCELERATION AND DECELERATION

1.. Acceleration is necessary to reach the desired speeds. Therefore, the function of acceleration is separate from the decisions and attitudes that influence speed selection covered in Objective 2.5.

2. The driver will have to make conscious adjustments in acceleration and deceleration habits based on the following criteria:

    a. Engine power, low gears or high gears, and engine responsiveness

    b. Traction conditions, dry or wet, materials under tires, and over-acceleration

    c. Roadway characteristics and design, uphill or downhill, straight or curve

3. Considering the above-mentioned criteria, acceptable strategies and methods for acceleration or deceleration are listed below:

    a. Acceleration and deceleration should be smooth, rather than rough, sudden, or aggressive. The smoothest application of acceleration is always most desirable, even when maximum acceleration forces are necessary.

    b. Acceleration or deceleration should be in direct relationship to the vehicle's intended path of travel. Acceleration can be greatest when the vehicle is positioned in the direction desired; less when not positioned as desired. This is most noticeable when exiting a

turning maneuver. Deceleration can occur at any time, including times when the vehicle is not positioned in the desired direction of travel.

BRAKING

1. The amount of braking necessary is usually determined by the available stopping distance. This was covered in Objective 2.12. Early deceleration reduces kinetic energy levels, allowing for smoother stopping. In contrast, rapid foot movement from acceleration to brake usually leads to dramatic, rough braking and increased chances for loss of vehicle control.

2. When the driver must begin braking, the available stopping distance will directly influence the decision as to which braking method is most appropriate. Regardless of the method selected, some skills are necessary.

    a. Apply pressure on the brake pedal with the upper half of the right foot, preferably with the heel contacting the floor. Try to pivot on the heel for greater sensitivity on the pedal. This involves less leg muscles and reduces unwanted "pumping" or "lock-up" of the brakes.

    b. Avoid left foot braking. The left foot must be available, if the brakes fail, to use the parking brake. Left foot braking also encourages riding the brakes. This causes brake fade and improper communication to following vehicles. Use the left foot as an "anchor" to support the lower body.

    c. Avoid staring at the front hood of the vehicle while braking. Check the conditions to the rear to avoid being hit from behind. Check conditions to the side in an effort to create an escape path-of-travel. Search ahead to see if the conditions which forced your braking actions have changed. Be mindful of the fact that the speed of the emergency vehicle determines the amount of distance that you need to search ahead. The greater the speed the greater the distance to be searched.

3. The braking methods selected will likely be influenced by one of the following conditions:

    a. Controlled braking - the driver has control of the stopping distance

    b. Sudden stops - the driver is forced to quickly stop in the shortest possible distance

c. Emergency conditions - the driver combines the strategies above in an effort to respond to an emergency situation as quickly and efficiently and as safely as possible.

4. When an officer enters one of these three conditions, the steps below will ensure safe braking.

a. Controlled braking

(1) "Early and Smooth" - steady constant pressure early, with a smooth release of pressure as the vehicle slows to a complete stop

(2) "Stab-Jab" or "Pumping" - apply brakes, release, apply again as necessary (applicable on wet or snowy surfaces with conventional braking systems)

b. Sudden stops

(1) "Threshold Braking" - maximum pressure short of lock-up, releasing gradually to avoid lock-up while maintaining maximum pressure throughout (conventional braking system)

(2) "Antilock Braking Systems" - allows controlled stopping under most conditions.

An antilock brake system (ABS) is the part of a vehicle's braking system that automatically controls pressure to prevent the controlled wheel or wheels from locking during braking. Motorists, when confronted with emergency situations, are likely to press too hard on the brake pedal, causing their vehicle's wheels to lock, which in turn causes skidding and loss of control. ABS, by preventing wheel lockup, allows drivers to maintain control of their vehicles even in "panic stop" situations. Maintaining control can be a key factor in collision avoidance. Most antilock systems also enable the vehicle to stop in a shorter distance, particularly on wet or slippery road surfaces.

During ABS operation, drivers should expect to feel the brake pedal pulsating. This pulsating occurs as a result of the brake pedal pulsating. This pulsating occurs as a result of the brake fluid pressure changes in the brake system when the ABS is activated. This is not an unusual situation and the driver should continue applying pedal pressure as required.

Current antilock systems can release and reapply the brakes as many as 15 times per second. By allowing the wheels to continue rolling, the driver is always able to maintain control and stop the vehicle on slippery surfaces in a shorter distance than would be possible otherwise.

Antilock systems control either the two rear wheels or all four wheels of the vehicle. In general, the four-wheel systems provide better stability and control during braking compared with the two-wheel systems because the steered wheels do not lock up.

> **In the event of a malfunction in the antilock system, braking, without the ABS function, is maintained on the vehicle and a warning lamp on the instrument panel alerts the driver that the ABS is in need of repair.**

Automotive service technicians who work with ABS equipped vehicles also require additional training. Technicians must receive manufacturer product service training on Antilock Brakes Systems. This ensures technicians are qualified to inspect and repair vehicles equipped with ABS.

Items such as the pulsating effect of the brake pedal during activation of ABS is important information for officers. The knowledge of the ABS warning lamp symbol and functioning (see owner's manual), is also important for police officers. This explains that should the ABS warning lamp symbol "light up" on the instrument panel, during driving, the vehicle no longer has ABS brake capability, however, traditional power brakes will be activated until the vehicle can be returned for service. Hands-on familiarization of the ABS braking and handling system completes the last element of training.

Officers should be taught that when the pedal is pushed on a car equipped with antilock brakes, there is a pulsing sensation. The antilock brakes are doing their own "pumping". An officer should not pump the pedal, otherwise, he or she will defeat the purpose of ABS or lessen the effectiveness of the brakes.

VEHICLE POSITIONING AND STEERING

1. Equally important for vehicle control is the steering function and how it relates to vehicle positioning. Most drivers develop a "feeling" for where the vehicle is positioned. When they have difficulty creating this ability they will increase collision potential to the front, rear, and sides of their vehicle. The ability to properly position a vehicle increases with a small amount of practice or the use of an effective positioning system.

2. Steering is a combination of analyzing the vehicle's position and where the driver wants to re-direct it. Steering strategies are necessary for lateral positioning and changes in direction. Steering combines hand positioning with hand movement.

3. Acceptable hand positioning methods and advantages are:

a. "9-3" or "10-2" are the two acceptable hand positions with light finger pressure, heavier pressure with thumb. Excellent for quick steering needs, body balance, and quick access to dashboard control items.

b. "9-3" is recommended for urban driving situations where speeds are usually under 45 mph and steering inputs are more frequent.

c. "10-2" is recommended for rural driving situations where speeds exceed 45 mph and steering inputs are seldom required (i.e., interstate).

d. One hand at the "12 o'clock" position is primarily used when backing in addition to turning the body and looking in the direction that the vehicle is moving.

4. Acceptable hand movements for steering methods and their advantages are:

a. "Shuffle Steering" - avoid crossing the hands by sliding the wheel in small amounts. Best for gradual turns.

b. "Hand-over-Hand" - turning the wheel the maximum amount and then crossing the bottom hand to the top of the wheel to allow for continued steering. Fastest method for skid control.

c. "Evasive Steering" - with hands at "9-3" or "10-2", turn the wheel 1/2 rotation, then a full rotation in the opposite direction, and finally back to the original position.

5. Regardless of which steering method is used, the driver should be aware of and concentrate on searching the desired path-of-travel. The driver will tend to steer the vehicle where he is looking; therefore, he should be looking (searching) at the desired path-of-travel.

SUMMARY

Vehicle control methods, when misused or improperly employed, will certainly increase the likelihood of a collision. When the driver develops a foundation of acceptable control methods and acceptable perceptual and decision-making skills, the likelihood of a collision is greatly reduced.

SUGGESTED INSTRUCTIONAL METHODOLOGY

LECTURE WITH VISUAL AIDS

Utilizing the suggested content, develop a presentation for the class. Slides, videotape, pictures, or other visual aids will reduce confusion and enhance the concepts presented.

SMALL GROUPS

Divide the class into groups of 3-6 students. Draw an intersection on the chalkboard depicting a law enforcement vehicle approaching the intersection preparing to turn to the right. Ask each group to list what vehicle control methods they would use to perform the right turn. Encourage specificity in their responses. List the group responses on a master sheet and encourage class reaction. Supply the correct answers after 5-10 minutes of discussion.

RESOURCES AND AIDS

1. Acceptable driver training textbooks and manuals

2. *Reference Points for Precision Driving*, by Frederick Mottola

SUGGESTED EVALUATION METHODOLOGY

STUDENTS

1. Written or verbal responses to questions concerning acceptable vehicle control methods

2. Identification of acceptable methods will not guarantee correct performance. Develop the opportunity for demonstrating these methods.

COURSE

1. Observe on-the-job performance

2. Review collision reports